Walter Reed: Electric Eels

Executive Summary

The District plans to lease or sell the Walter Reed Medical Center but maintain control over its sustainability path. Our team has devised an ownership structure and tax credit policy that is compatible with a long-term lease or an outright sale strategy with an 18-year occupancy requirement. With our structure and the District's sustainability goals for the site, the developer will be heavily invested in the site by the end of the occupancy requirement.

The Walter Reed Medical Center will soon transition to a site that will produce property tax and sales tax revenues for the District. Since these revenues are largely new, a significant portion of them can be transferred to the developer in the form of tax credits. The District must provide property tax credits that exceed the costs of the energy and water efficiency improvements on the site, and impose penalties if the developer does not meet agreed-upon milestones. Our analysis shows that the property tax breaks of 20% at onset of the project that incrementally decrease to 2% as the final milestones of the project will help the developer meet the District's sustainability goals. Any penalty taxes paid by the Developer will go to a "Sustainability Fund" that DDOE can disperse for sustainable energy and water projects in the District.

As a complimentary policy, the District can reduce sales tax rates for businesses residing in the development's retail space. The reduction in sales tax will make the retail space more attractive to potential tenants, as customers may make the extra effort to shop at the Walter Reed development to save costs. The District stands to gain several non-monetary benefits as a result of a sustainable development at Walter Reed, further justifying the tax credit policies. These benefits include cleaner air, cleaner water, power supply reliability, reduced flood risk, and Green Power Community goal achievement.

Our team has recommended this policy and exemplified its operation through a specific set of technologies, namely blackwater treatment, biodigestion, combined heat and power generation, and absorption chillers. These technologies have the ability to achieve the goals of net positive by 2040 and full water reuse by 2050 set out by the District, but will not be required for implementation by the developer. In this way, the developer of Walter Reed can have full innovative control of achieving the milestones set out by the District. In efforts to maximize their profits, the developer may innovate cheaper or novel combinations of technologies.

The District, the developer, and the community all achieve net-benefits from our proposed ownership structure, making the implementation and success of the project highly likely. Our tax credit policy is a scalable solution for other government-owned properties.

Introduction

The District of Columbia is planning to convert the former DoD Walter Reed Medical Center campus into a sustainable mixed-use neighborhood development. Our team has been tasked by the LRA to propose a plan for ownership structure and redevelopment that will help the district meet its ambitious water and energy sustainability goals.

Literature Review

The Dockside Green project located in Victoria British Columbia Canada is an example of a large sustainable mixed use development. The design intention of the 15-acre site was to be a zero-carbon development and obtain LEED ND Platinum certification. Development planning principles include: increased density, minimized public parking, renewable energy sources, green and open space, a sustainable storm water management system, 100% sewage treatment on site, 26 LEED Platinum certified buildings, a biodiesel facility, and walkable corridors. The project estimates a total GHG emission reduction per year of 5,215 tons, and 45-55% energy savings. (Farr, 2008) Dockside Green shows that sustainable practices can be accomplished in a short timeframe and receive "triple bottom line" benefits; economic profits, social benefits, and environmental benefits. The principled within LEED ND and those outlined within this report provide economic, environmental, and social benefits to the District of Columbia.

The popularity of green and sustainable buildings has increased the demand for LEED buildings. Based on a report reviewing the success and existing conditions of the David Lawerence Convention Center (DLCC), VisitPittsburgh identified 23% of the US meeting industry as "looking for green events." Companies can use the green initiative to enhance their marketing campaign and participate in the popularity of "green seeking." The concept of "green seeking" can be utilized as a marketing campaign for the developer; it provides an added incentive to perspective tenants.

Plan of Action

Our team recommends LRA arrange an outright sale or long term lease to a Master Developer with at least an 18 year occupancy requirement. The terms of the contract will require the Master Developer to meet intermediate water and energy sustainability milestones, so that Walter Reed meets the long term Sustainability Goals and Principals set out by the District. The District will award property tax and sales tax incentives to the Developer and tenants for meeting the intermediate goals. All incentives will be revenue-neutral to the District and will be structured so that noncompliance with the intermediate sustainability goals would be more costly to the Developer than foregoing the incentives. If the Developer misses a milestone, extra

revenues from taxes will go to a “Sustainability Fund” that the District Department of the Environment will have authority to spend on appropriate sustainable energy and water projects throughout the District.

We refrain from prescribing specific technologies for the Developer to use to meet its goals, but make some recommendations as outlined in the following paragraphs. In developing their own technological approach, the Master Developer will be more invested in the project and as a result the project will have a greater likelihood of success.

While we do not mandate LEED ND certification we recommend the developer’s and the Architectural Engineering (A/E) design team’s contract include a provision mandating community involvement. LEED and this report identify numerous sustainable practices. While it is important to include sustainable design practices in any development, it is of equal importance to obtain community buy in. Community support and involvement bolsters civic pride, increases public awareness, and provides a positive marketing campaign to the site which can entice potential tenants. The developer and the A/E team should hold regular community workshops and meetings to discuss the various certification options and sustainable design practices. During the workshops, the developer and A/E team shall educate the community about the sustainable alternatives, the pros and cons or each and enlist suggestions. The idea of a workshop instead of a hearing provides a tone to everyone that the Walter Reed development site’s goal is to provide benefits to all team members. Additionally, by working with the community, the Walter Reed site becomes a national success story of triple bottom line profits and benefits. The Dudley St. project in Boston, MA is an example of a 64-acre site that saw dramatic improvements with the help of positive community involvement (DSNI, 2011).

Technology Recommendations

Given the 2040 goal of Walter Reed becoming a net positive energy site, in combination with the full water reuse goal by 2050, we recommend the District prioritize the linking set of technologies described below. These technologies include blackwater treatment, anaerobic biodigestion, combined heat and power (CHP) engines, and absorption chillers. The District can recommend these technologies to the developer, as long as the developer meets the sustainability milestones for the site. In efforts to detail the financing of the energy and water goals of the site and prove the concept of our policy, our team has estimated the cost for these specific technologies. However, any set of technologies can be used as long as the costs and benefits meet the incentive structure outlined later in this report.

- *Blackwater treatment* would require piping toilets, showers, sinks, and other wastewater lines to an on-site treatment system that separate the organic solid wastes and generate reusable water from the liquid. A filtration and disinfection process can treat wastewater to reusable standards, and even potable standards when rainwater storage is running low.

- An *anaerobic biodigestion system* will handle the organic wastes from the water treatment plant and process the waste for a retention period of approximately 90 days. The process will generate an organic fertilizer than can be used on-site or sold off-site. A biproduct of the digestion process will be methane.

- *Combined heat and power engines* can run on the methane biproduct to generate electricity at approximately a 40 percent electrical generation efficiency, and 45 percent heat generation efficiency. A modular system with several small CHP engines that turn on and off throughout the day can meet the varying power demand of the site, while the heat is circulated throughout the campus to meet thermal loads.[1]

- *Absorption chillers* use heat as the energy source in providing cooling. During the summer, the heat generation at the CHP engines can be diverted to these chillers in a process commonly known as trigeneration.

We have estimated the costs to the developer for the biodigestion and trigeneration systems in Table 1. We estimate that the preceding technologies will account for approximately 90 percent of our annual power demand, due to limitation in the amount of on-site waste generation and conversion to biogas. We assume the remaining 10 percent of the power will be fulfilled by photovoltaics. These cost estimates are integral to our incentive based tax policy outlined in the following section, but as mentioned earlier, the District and developer can adjust the incentive structure for different technologies and associated costs.

The costs have been apportioned to the major milestones of the reuse plan using the total cost estimates in 2013 dollars. (Note: Our team estimated energy and water demand assuming highly energy and water efficient building design throughout the site. The systems have been sized to meet the full energy and water demands of the site, and the costs have been obtained from past project experience from one of our team members.) For example, for the 50% energy goal by 2020, 50% of the total biodigestion system and CHP facility costs have been apportioned, in order to reflect a modular build-out by the developer. By 2025, the developer must add an additional 30% of energy production to achieve the 80% energy intermediate goal, or $1.5 million of biodigestion capacity and $2.6 million in CHP capacity. Electricity Benefits increase beyond 100% beginning in year 2040 to reflect the development's net positive generation and selling of power to PEPCO. Water utility benefits increase proportionally to the amount of water that is getting reused on the campus.

Note that the milestone costs illustrate the cumulative expenditures necessary by the developer over the preceding years. For example, the developer will spend a total of $8.75 million (in

[1] The developer will have incentive to reduce power demand through efficient building design to reduce central plant size and costs

present day dollars) from 2021 to 2025 for all of the technologies, or approximately $1.75 million per year.

Table 1. Costs of Sustainable Improvements to Walter Reed

		Reuse Goal	*50% Energy / Gray*	*80% Energy*	*100% Energy / Black*	*105% Energy*	*110% Energy / Full Reuse*
Item		**2013 Cost**	**2020**	**2025**	**2030**	**2040**	**2050**
Biodigestion		$5,105,871	$2,552,935	$1,531,761	$1,021,174	$255,294	$255,294
CHP Facility		$8,634,802	$4,317,401	$2,590,441	$1,726,960	$431,740	$431,740
Wastewater Treatment Plant		$6,397,617	$3,198,809	$1,919,285	$1,279,523	$319,881	$319,881
Building Construction		$5,064,790	$5,064,790	$0	$0	$0	$0
Operating Costs		$1,397,713	$1,397,713	$1,397,713	$1,397,713	$1,397,713	$1,397,713
Photovoltaics (incl. SRECs incentive)		$8,587,620	$4,293,810	$2,576,286	$1,717,524	$429,381	$429,381
Electricity Benefits		($1,222,101)	($611,051)	($977,681)	($1,222,101)	($1,283,206)	($1,344,311)
Water Benefits		($713,402)	($142,680)	($285,361)	($428,041)	($570,722)	($713,402)
Total Costs of Achieving Goal By Year-End			$20,071,727	$8,752,444	$5,492,753	$980,081	$776,296
Costs as a percent of the 2013 costs.	Energy/Water		50%	30%	20%	5%	5%
	Electric Utility		50%	80%	100%	105%	110%
	Water Utility		20%	40%	60%	80%	100%

As an additional recommendation to reduce electrical demand, *ground source heat pumps* provide an efficient way to heat and cool buildings. Through a psychometric analysis, we found that Washington, D.C. has approximately 3,500 heating degree days and only 1,500 cooling degree days. Appropriately sized ground source heat pumps would maintain a balanced earth temperature by meeting only 1,500 heating degree days, and allowing other means (solar thermal, natural gas) to provide heating for the site.

Financial Incentives to Encourage Adherence to Recommended Strategies

Currently, under the ownership of the Federal Government, the Walter Reed site is exempt from local regulations, including taxes. Once ownership of the site is transferred to the developer, the site will become subject of all District of Columbia taxes. The property tax rate for commercial property assessed at over $3 million is $18,500 for every $1 million of property value. With the Walter Reed site valued at upwards of $1 billion, the owner stands to pay approximately $20 million in property taxes every year[2].

Though large, the tax burden of the site is an opportunity for providing owner incentive to maintain sustainable strategies on the site. As part of the District's agreement with the owner, future energy and water performance minimums can be set and tied to property tax rebates. The proposed incentives can be packages as an "all or none" deal, holding the owner accountable for the maintenance of all sustainable strategies in order to qualify for the property tax discount, or

[2] http://www.npr.org/2011/08/30/139641834/walter-reed-centers-closure-may-be-a-boon-to-d-c

smaller incentives can be assigned to specific environmental goals that then add up to a similarly significant rebate. Further future tax breaks can be offered if the owner demonstrates further initiative by implementing new sustainable measures that were not present at the time of the sale. The tax incentive structure must be designed to stipulate that the cost of compliance is much less than the penalty for non-compliance.

In addition to property tax rebates, the District can offer an incentive plan for retail businesses that lease property from the new owner. The current sales tax rate in the District is 6%. If the owner and their retail partners continue to maintain the operation of their properties in accordance with the sustainable recommendations, then the retail establishments on the Walter Reed site can qualify for a sales tax rebate that can be passed on to shoppers. This would create a significant incentive to attract new retail businesses to the site because of the potential for increased sales. A sales tax incentive also has the potential to attract an increased volume of business from Maryland residents, where the sales tax rate is 7% in Montgomery County.

As an additional measure, the District may also choose to impose sustainable energy and water business practice requirements on all retail tenants in order to receive a sales tax reduction. The District may choose to provide these tax credits to all businesses that adhere to the sustainable energy and water practices within their jurisdiction in order to mitigate market cannibalization. Our analysis shows that a 1% sales tax break will divert approximately $1.3 million per year in revenues to the District.[3] As this would be new revenues that the District would have otherwise not received, it does not affect the District's revenue-neutral goals.

A balance must be struck between the owner and the District whereby both parties benefit. The District is eager to collect on future tax revenues of the site, yet neighboring Montgomery is aggressively courting new businesses to develop in its borders by offering significant business incentive plans. Montgomery County's property tax rate is also less than half of the District of Columbia's for commercial businesses. By offering the lower property tax rate incentive, the Walter Reed site becomes a much more competitive offering to developers whose alternative is to invest in projects located just across the border.

A basic illustration of the cash flows between the developer and the District follows in Table below. In the years 2021 through 2025, the developer will be making incremental improvements to achieve the 80% energy production goal. In the years where the developer makes the improvements, they receive a tax break that is $1.25 million higher than the investment they make designed to incentivize sustainable improvements. If the developer fails to make enough progress -- as they do in the year 2024 -- then the developer is required to refund a proportional amount to the District as a penalty. The District will verify the developer's progress through on-

[3] Using average sales/s.f. data and inflation, retrieved from http://www.census.gov/newsroom/releases/archives/facts_for_features_special_editions/cb07-ffse07.html

site audits and review of invoices, and any excess revenues will be directed to the "Sustainability Fund."

Table 2. Cash flow of property tax revenues for Master Developer and District

Cash Flow	2021	2022	2023	2024	2025	Sum
Total costs of technologies by developer	$1,750,489	$1,750,489	$1,750,489	$500,000	$1,750,489	$7,501,955
Property tax break to developer	15%	15%	15%	-11%	15%	-
Property tax break to developer	$3,000,000	$3,000,000	$3,000,000	($2,143,096)	$3,000,000	$9,856,904
Property tax revenue to District	$17,000,000	$17,000,000	$17,000,000	$22,143,096	$17,000,000	$90,143,096

Using the total costs for the developer, the percent property tax to the developer would adhere to a schedule similar to the following:

Year Span	Property Tax Break
2013 - 2020	20%
2021 - 2025	15%
2026 - 2030	10%
2031 - 2040	5%
2041 - 2050	2%

It is the goal of the tax incentive plans to allow the District to move towards a revenue neutral position. Though there will be less taxes coming in from the site itself due to incentives, the positive commercial and residential growth of the Walter Reed site will have positive benefits to the surrounding neighborhoods. In the past, because of the nature of Walter Reed Hospital's self-contained operations, the commercial tie-ins with businesses in the local community were not strong. The patient population generally stayed on campus, and although they and Walter Reed's employees did make a contribution to the local economy, it was modest in scale.

With a change to commercial, retail, residential, and academic use on site, there will be a much greater opportunity for employees and residents from the development to generate business revenue in the surrounding community. This will provide the District with increased sales tax revenue from the dining, retail, and service industries. Private development of the site will also undoubtedly affect property values of the neighborhoods that touch the site on the north, east, and south borders. With a strategic approach to tax incentives for the site, the District can still maintain a long term goal of increasing tax revenue by the $20 million per year due to changes in the Walter Reed site's ownership.

In addition to District property tax incentives, the developer of the site will be able to take advantage of Federal tax deduction 197D. With $0.60 per sq.ft. for MEP (20% improvement

better than the ASHRAE 90.1 2001 standards), $0.60 for lighting (20% improvement), and $0.60 for building envelope upgrades (10% improvement), this provides for tax breaks as high as $1.80 per sq.ft for renovated buildings.

By reducing the peak electric load of PEPCO in the DC area, the Walter Reed development will help prevent dangerous blackouts and brownouts on hot summer days as well as the need for PEPCO generation capacity additions. Lawrence Berkeley National Lab estimates that power outages cost the Mid-Atlantic region $9.7 billion annually (LaCommare, 2004). PJM, the Independent System Operator (ISO) that encompasses PEPCO, values capacity availability at $109/MW-day. When Walter Reed is fully net-zero, they will be helping PEPCO avoid 8 MW of capacity, or $318,000 per year (PJM, 2012).

Reducing the amount of storm water run-off is especially important in older cities such as Washington DC. Design features such as previous concrete, grass pavers, vegetated swales, vegetated storm water detention features, bio-retention features, and green roofs can reduce storm water runoff and thus reduce the strain on an overburdened sewage storm water infrastructure. Switching from typical concrete paving to porous concrete paving has the potential to reduces storm water runoff by 21 gallons per sq.ft. per year.

DC values its EPA designation as a Green Power Community (GreenDCDaily, 2011). To achieve this distinction, the District purchased 8% of its power, or 756 million kWh, from green power. The difference in cost between green power and traditional power is around 3 cents per kWh (using wind power and natural gas - conventional combined cycle as examples) (EIA, 2012). Therefore, the District spends around $23.4 million annually to achieve that rating. When the Walter Reed development reaches the 100% renewable goal, they will be producing on the order of 50,000 kWh per day. That equates to 2.5% of the District's current renewable power consumption and $580,000 annually in renewable energy power consumption.

District Incentives

District of Columbia provides financial incentives through three different channels in efficiency deployment: 1) Energy Efficiency Financing; 2) Solar Renewable Energy Certificates (SRECs); 3) Renewable Energy Incentive Program. The Developer can take advantage of these to defray costs.

The efficiency financing (PACE Financing) is available to all sectors including commercial. Eligible technologies include equipment insulation, lighting, chillers, furnaces, boilers, heat pumps, central Air conditioners, heat recovery, energy management systems/building controls, caulking/weather-stripping, building insulation, windows and doors. The financing mechanism is structured that the property owner pays the loan on his/her property tax bill over 10 to 20 years at a competitive rate of interest.

The SRECs are applicable to solar water heating, solar space heating, solar thermal process heating and photovoltaics among both commercial and other type of users. Current SRECs

average to $0.38/kWh where the maximum amount of incentive can be as high as $0.50/kWh. The systems must be certified D.C. Public Service Commission for eligibility.

The renewable energy incentive program comes in the form of rebates for commercial and other applications. Only photovoltaic systems are eligible for this incentive. The rebate amount decreases with capacity size: $1.50/W DC for first 3 kW installed capacity; $1.00/W DC for next 7 kW; $0.50/W DC for next 10 kW. The maximum incentive size is $16,500 per site per program year.

Utilities

The district levies a runoff charge of $6.64 per 1000 ft2 per month. If the developer cuts in half the size of impervious surface at Walter Reed, they stand to save almost $100,000 annually. The Anacostia Watershed Society offers a $5/ft2 green roof incentive up to 5,000 ft2 (DDOE, 2011).

PEPCO offers commercial and industrial customers up to $26,000 in incentives for energy efficiency retrofits and original construction (PEPCO, 2010). The developer and possibly commercial tenants could take advantage of this program.

Discussion

The redevelopment of Walter Reed is an opportunity to shine the spotlight on an oft-overlooked neighborhood in D.C. Our plan uses incentives and penalties to bring sustainability to all levels of site interaction, from the Master Developer to each building tenant. To implement this plan, the LRA should immediately begin a request for proposals and solicit community input for the final choice of Master Developer. The District government must audit the Developer's progress at regular intervals, and the community should be kept informed of their achievements and shortfalls. It will be important to keep the community informed about how construction will disrupt their daily lives and to keep those disruptions to a minimum.

Our development plan could easily be extended to other neighborhood redevelopment locations or other sites scheduled for closure or realignment under BRAC. Existing buildings on many military installations would be able to be reused, power stations could be repurposed into CHP or biomass, and large open spaces would give new developments plenty of permeable surface area.

If the District is able to maintain revenue neutrality after changing the site, it has much leeway in providing tax credits for fostering sustainable development. As our analysis shows, much of the revenue generated past the year 2020 will be redirected toward the "Sustainability Fund." The District's main responsibilities are to provide tax credits that foster sustainable development, and use excess revenues to do the same elsewhere in the District.

The developer's main priorities are to design innovative methods to achieve the goals of the agreement with the District. The more creative and cheap methods used to reduce energy use and

reuse water, the more profit is generated from the tax credits provided by the District. The developer must also uphold to the District's requirements that the community be involved throughout the development process.

Facilitated by the District or District-hired consultant, the community must participate in hearings to let the developer know their opinion the development process. Related to energy and water, there may be symbiotic opportunities for the developer to process some neighborhood wastewater and/or provide energy in return to the neighborhood.

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